

## EARLY WARNING SENSOR FOR LI-ION BATTERY OVERHEATING IN ELECTRIC VEHICLES IN THE MAKING

October 31, 2023. SmartNanotubes Technologies, a Silicon Saxony startup that has developed the world's first electronic nose chip "Smell iX16" for mass market applications, and Linxens, the global leader in SmartCard Technology, RFID tags and reel-to-reel flexible electronics united their efforts to develop a disruptive early warning sensor for Li-ion batteries in electric vehicles.



### Newspapers daily report incidents of electric vehicles suddenly catching fire

With exponentially growing numbers of electric vehicles worldwide, the danger of fires caused by out-of-control Li-ion batteries increases dramatically. Recently a car-carrying freight ship caught fire on the North Sea when one electric vehicle ignited. Tugboats could tow the ship into a Dutch port, but this could have had severe ecological consequences for the coast of the Netherlands.

Thus far, there is no reliable solution to give an early warning of the battery runaway phenomenon. Linxens and SmartNanotubes will be the first to addressing this issue and providing a solution by detecting gases emitted early on in this process. The latter contributes through its unique smell detection technology, whereby Linxens brings in their expertise in miniaturization and mass-fabrication of flexible electronics.

### Saving lives and prevent infrastructure damages

*"The Li-ion battery monitoring market is a huge market, which provides tremendous scalability. By solving the early detection problem in case of an outgassing event in Li-ion batteries, our common development will save lives and prevent severe infrastructure damages. Together with Linxens as a partner we can produce tens of thousands of EV battery runaway sensors already by next year," says Viktor Bezugly, CEO & Co-Founder of SmartNanotubes Technologies. "Moreover, the miniaturization of our chip down to 7x7mm size opens a new possibility of application of our e-nose technology in wearable and mobile devices."*

SmartNanotubes sensing technology can detect outgassing from Li-ion battery cells types several minutes before their thermal runaway, and in some cases up to 20 min in advance. The very early detection from two different battery types was successfully demonstrated. The tests were performed at the facility of Brandweer Trainingscentrum Kleefse Waard, Arnhem, Netherlands, and at the facility of Fraunhofer Institute, Germany. Linxens and SmartNanotubes have developed and successfully tested the first prototype of a miniaturized sensor module which will be the main component of the future product. *"Smell and complex gasses recognition requires an unique combination of transducers matrix with signal filtering and machine learning methods. Linxens will bring its expertise in large volume manufacturing of electrochemical electrodes to develop thin, flexible and cost effective transducers' matrix based on SmartNanotube sensing technologies. We believe the future of sensing is not to develop a new material for each use case, but to rely on a pre-qualified highly sensitive transducers*

*platform, associated with advanced machine learning algorithms to reduce the time to market from decade to months !” confirms **Roland Guillemain, VP of R&D and Innovation at Linxens.***

### **Game changer in the multi gas sensor market**

The SmartNanotubes' e-nose technology is mimicking a human nose in terms of the principle of smell detection. Instead of receptors of a biological nose, the smell detector chip has a variety of fine-tuned nanomaterials as sensing elements, which ensure an outstanding sensitivity, highly compact structure and close to zero power consumption. AI-based software is responsible for a real-time recognition of odor-specific signal patterns read from the detector chip. Thus, SmartNanotubes provides a very compact, energy efficient and cost-effective platform technology for the use in various odor-related applications.

#### **Press Contact**

Dr. Viktor Bezugly

E-mail: [bezugly@smart-nanotubes.com](mailto:bezugly@smart-nanotubes.com)

Tel: +49 351 850 73 684

#### **Press Agency Elektron for Linxens**

Elsa Mathivet

E-mail: [elsa@elektron-presse.com](mailto:elsa@elektron-presse.com)

Tel: +33 6 15 87 23 32

### **About SmartNanotubes Technologies**

SmartNanotubes Technologies was founded, after 10 years of research on nanomaterials, in 2020 by Dr. Viktor Bezugly and Dr. Birte Sönnichsen together with two other colleagues in Freital near Dresden as a spin-off of the Life Science Incubator Saxony. With his team, Bezugly had previously spent several years on the development of a smell detector chip. SmartNanotubes' sensors can detect single gases, smells and volatile organic compounds (VOCs). Applications range from environmental and security applications to home and industrial safety, wearables and IoT lifestyle products. The multi-channel sensor module can be easily integrated into various devices. The sensors come with AI-based Smell Annotator software, which provides customers access to the company's proprietary database of smells. For more information, please visit: <http://www.smart-nanotubes.com>

### **About Linxens**

A major player in the global electronics industry, Linxens designs and manufactures RFID microconnectors and antennas for security, identity and IoT, as well as biosensors and wearables for connected health. With over 120 billion micro-connectors and 6 billion RFID antennas produced to date, Linxens develops technology solutions based on its components for the telecoms, transport, hospitality, leisure, financial services, government, access control, healthcare and IoT markets. Headquartered in France, Linxens has 9 production sites, 5 R&D centers and employs 3,500 people worldwide. For further information: <https://www.linxens.com>